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FLUOROSIS AND HEALTH ASPECT IN SEHORE DISTRICT (MADHYA PRADESH)

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1.1 INTRODUCTION

It is well known fact that the excess fluoride intake is responsible for dental and skeletal fluorosis. The problem of fluorosis has been known in India for a long time. The disease earlier called mottled enamel" was first reported by Vishanathan (1935) to be prevalent in human beings in Madras Presidency in 1933. Mahajan (1934) reported a similar disease in cattle in certain parts of old Hyderabad state. However, Shortt (1937) was the first to identify the disease as "Fluorosis" in human beings in Nellore district of Andhra Pradesh.

Fluoride is present in the teeth, bones, thyroid gland and skin of animals. It plays an important role on the formation of dental enamel and normal mineralization in bones but can cause dental fluorosis and adversely affect the central nervous system, bones, and joints at high concentrations (Agarwal *et al.,* 1997). The fate of fluoride in the soil environment and groundwater is of concern for several reasons. It is generally accepted that fluoride stimulates bone formation (Richards *et ai,* 1994) and small concentration of fluorides have beneficial effects on the teeth by hardening the enamel and reducing the incidence of caries (Fung *et al.* 1999). At lower levels (<2 mg/ml) soluble fluoride in the drinking water may cause mottled enamel during the formation of teeth, but at higher levels other toxic effects may be observed (Weast and Lide, 1990). Excessive intake of fluoride results in skeletal and dental fluorosis (Czarnowski *et al.* 1999). Severe symptoms lead to death when fluoride doses reach 250-450 mg/ml (Luther *et al,*. 1995). It has been found that the IQ of the children living in the high fluoride areas (drinking water fluoride > 3.15 mg/ml) was significantly lower (Lu *et al.,* 2000).

Fluoride enters in the human body mainly through the intake of water and to a lesser extent by food. The foods which are rich in fluoride include fish and tea (EPA, 1997). Ingested fluorides are quickly absorbed in the gastrointestinal tract, 35-48% is retained by the body mostly in skeletal and classified tissues, and the balance is excreted largely in the urine. Chronic ingestion of fluoride rich fodder and water in endemic areas leads to development of fluorosis in animals e.g. dental discoloration, difficulty in mastication, bony lesions, lameness, de-ability and mortality (Patra *et al.,* 2000).

Naturally occurring fluorides in groundwater are a result of the dissolution of fluoride containing rock minerals by water while artificially high soil fluoride levels can occur through contamination by application of phosphate fertilizers, sewage sludge, or pesticides (EPA 1997). Due to its strong electronegativity is attracted to positively charged calcium in teeth and bones. Major health problems caused by flouride as dental florosis, teeth mottling, skeletal fluorosis and deformation of bones in children as well as in adults. Excess flouride affects plants and animals also. The effect on agriculture was also evident due to inhibition an plant metabolism leading to necrosis, needle scratch and tip burn diseases.

India is one among the 23 nations around the globe where health problems have been reported due to excessive fluoride in drinking water. An estimated 62 million people in India in 17 out of 28 states are affected with dental, skeletal and non skeletal fluorosis. The endemic states with the percentage area affected are given in Table 6.1.

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Table - 1.1 Indian states with areas affected by fluoride poisoning

No.	State	Area Affected (%)
1.	Assam	-
2.	Andhra Pradesh	50 – 100
3.	Bihar	30 - 50
4.	Delhi	< 30
5.	Gujarat	50 – 100
6.	Haryana	30 - 50
7.	Jammu & Kashmir	< 30
8.	Karnataka	30 - 50
9.	Kerala	< 30
10.	Maharashtra	30 – 50
11.	Madhya Pradesh	30 - 50
12.	Orissa	< 30
13.	Punjab	30 - 50
14.	Rajasthan	50 - 100
15.	Tamil Nadu	50 - 100
16.	Uttar Pradesh	50 - 100
17.	West Bengal	-

1.2 SOURCES OF FLUORIDE :

Various sources of fluoride entering the body are drinking water, food, industrial exposure, drugs and cosmetics etc. However, drinking water is considered as the major contribution to fluoride entering the human body.

1. Drinking Water

The major source of fluoride in the groundwater is fluoride bearing rocks from which it get weathered and / or leached out and contaminates the water. Fluorides occur in three forms, namely, fluorospar or calcium fluoride (CaF_2), apatite or rock phosphate [Ca_3F $(P0_4)_3$ and cryolite (Na_3AIF_6). Concentration of fluorides is five times higher in granite than in basalt rock areas. Similarly, shale has a higher concentration than sandstone and limestone. Alkaline rocks contain the highest percentage of fluoride (1200 to 8500 mg/kg) (Chand, 1998).

The Geological Survey of India has brought out considerable data which reveal that fluorite, topaz, apatite, rock phosphate, phosphatic nodules and phosphorites are widespread in India and contain high percentage of fluorides.

2. Food

Besides water, food items especially agricultural crops are heavily contaminated with fluoride as they are grown in the areas where the earth's crust is loaded with fluoride bearing rocks. Fluoride is present to some extent in nearly all foods, but the concentrations vary widely. Studies of the fluoride contents of foodstuffs reported in the WHO Monograph (1970) have been reviewed by Muhlar (1970). Prival and Fisher and have made a more recent compilation on fluoride contents.

Among the foodstuffs notably high in fluoride are fish, particularly those, such as sardines, that are eaten with the bones. Fish-meal flour, which is produced from the whole fish, is also high in fluoride. Tea is unusually rich in fluoride. Milk and most fruits are generally low in fluoride. Vegetables vary greatly in fluoride content.

Hodge and Smith (1965) computed the total fluoride intake from food at 0.5-1.5 mg/day for areas with nonfluoridated water. Marier and Rose (1966) showed that use of fluoridated water in canneries increased the fluoride content of canned food by 0.5 mg/liter and converted this to 0.5 mg/day in the diet. The proposed total intake from the diet then became 1.0-2.0 mg/day.

However, Hodge and Smith estimate came from Machle and Largent (1943), whose values were based erroneously on earlier work (Machle *et al.,* 1942). In this earlier work the average total fluoride intake per day for 20 weeks was just under 0.5 mg with only 0.16 mg of the intake from food as such. In a more recent review Hodge and Smith (1970) have lowered their estimate 0.3-0.8 mg fluoride daily from the diet.

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Recent studies indicate that the total intake of fluoride is as high as 3 mg/day rather than the earlier figure of 1.5 mg/day, primarily because of increases in the estimated levels of fluoride in foods (Spencer *et al.,* 1970). Balance data presented by Spencer also suggest a higher retention by bone, nearly 2 mg/day rather than the 0.2 rag/day indicated earlier.

Two recent articles from Spencer's group (Kramer *et al.,* 1974; Dace *et al.,* 1974) appear to support a higher estimate for dietary fluoride intake. The first is based on hospital-prepared food from 16 U.S. cities. The fluoride intake from food in the fluoridated communities was found to range from 1.6-3.4 mg/day (av. 2.6) while that from nonfluoridated cities was 0.8-1.0 mg (av. 0.9). The very high values and the marked difference between fluoridated and nonfluoridated cities can be explained in part by the inclusion of coffee and other water-based beverages as dietary intake. This classification is not usually followed by other investigators. The second article reports average fluoride intake from diets used in balance studies in a fluoridated city over a 6-yr period as 2.0 mg/day.

These findings are important because, if valid, they might represent a shift in intake that could lead to dental Fluorsis in fluoridated communities. Also, a retention of 2 mg/day would mean that an average individual would experience skeletal Fluorsis after 40 yr, based on an accumulation of 10,000 ppm fluoride in bone ash. However, these new estimates for fluoride in food are questionable; consequently, so are their implications. The values are suspect because of analytical problems. The diffusion method of Singer and Armstrong (1969a) was used with a colorimetric reagent and false high values are obtained with this technique (Taves, 1966).

A study more limited in scope, because it was restricted to 16 to 19 yr old males, found 2.0-2.3 mg/day total fluoride intake (San Filippo and Battistone, 1971). The increase over earlier values may reflect the fact that the food portions were large for the test group.

Data from balance studies in children tend to support the lower values. The dietary fluoride intake for nine children aged 4 to 18 years averaged 0.3 mg/day (Forbesero, 1973).

The quickest and most reliable method of checking whether there has been a shift in total intake of fluoride in the past 20-30 yr is through surveys of the urinary and bone fluoride concentrations occurring in people in fluoridated communities. There has been no question about the analytical techniques used in these earlier data on urine and bone because the concentrations involved were relatively high. A recent (Parkins, 1974) bone survey in Iowa done at autopsies showed bone fluoride levels higher than those in earlier publications, particularly when taking into account that they are for unashed bone, which means that the concentrations need to be approximately doubled to compare them to values for ashed bone. Detailed comparison of the method he used has shown no systematic error, but other bone fluoride values found in Rochester, New York, show concentrations which match earlier values almost exactly (Charen *et a/.,* in preparation, 1976). The fluoride content in food material mainly depends upon:

1. Fluoride level in soil
2. Fluoride level in atmosphere
3. Use of fertilizers and pesticides and other sources of contamination.

The fluoride content of some food items has been given in Table 1.2

Table : 1.2 Fluoride content in various food

Food Item	Fluoride (mg/kg)	Food Item	Fluoride (mg/kg)
Cereals		Fruits	
Wheat	4.6	Banana	2.9
Rice	5.9	Mango	3.2

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Food Item	Fluoride (mg/kg)	Food Item	Fluoride (mg/kg)
Maize	5.6	Apple	5.7
		Guava	5.1
Pulses		Beverages	
Gram	2.5	Tea	60-112
Soybean	4.0	Coconut water	0.32 - 0.6
Vegetables		Spices	
Cabbage	3.3	Coriander	2.3
Tomato	3.4	Garlic	5.0
Cucumber	4.1	Ginger	2.0
Ladyfinger	4.0	Turmeric	3.3
Ladyfinger	4.0	Turmeric	3.3
Spinach	2.0	Food from Animal sources	
Mint	4.8	Mutton	3.0 - 3.5
Brinjal (egg plant)	1.2	Beef	4.0 - 5.0
Potato	2.8	Pork,	3.0 - .5
Carrot	4.1	Fishes	1.0 - 6.5

Source : Prevention and control Fluorsis in India. Vol.1 (Health Aspects) (Ed. Susheela, A.K.) Rajeev Gandhi National Drinking Water Mission, New Delhi.

3 . Drug and Cosmetics

The sodium fluoride containing drugs for Osteoporosis, Osteosclerosis and dental caries are in use for many years. The prolonged use of these drugs may cause fluorosis. Additionally, the toothpastes and mouth-rinses (whether labelled fluoridated or otherwise) also contain higher fluoride concentration. The fluoride content arising from raw materials used for the manufacturing of tooth-paste, namely, calcium carbonate, talc and chalk can have as high as 800-1000 mg/kg of fluoride. In the fluoridated brands of tooth-pastes, the fluoride content has been reported up to 1000-4000 mg/kg. Moreover, some of the mouth rinses are nothing but fluoridated water of a very high fluoride concentration.

1.3 <u>HEALTH IMPACTS AND FLUORIDE :</u>

1. Optimum concentration of fluoride in drinking water

According to WHO standards, the fluoride in drinking water should be within a range that slightly varies above and below 1 mg/L (Meenakshi *et* a/., 2004). In temperate regions, where water intake is low, fluoride level up to 1.5 mg/L is acceptable. The Ministry of Health, Government of India, has prescribed 1.0 and 2.0 mg/L as permissive and excessive limits for fluoride in drinking water, respectively. Table 3 shows different health impacts at varying fluoride concentrations in drinking water.

Table 1.3 Concentration of Fluoride in drinking water and its effects on human health

Fluoride Concentration (mg/L)	Effect
Nil	Limited growth and fertility
< 0.5	Dental caries

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0.5 - 1.5	Promoters dental health, prevents tooth decay
1.5 - 4.0	Dental fluorosis (mooting and pitting of teeth)
4.0 - 10.0	Dental fluorosis, skeletal fluorosis (pain in neck bones and back).
> 10.00	Crippling fluorosis.

1.4 SENSITIVITY TO FLUORIDE :

A recent report (Grimbergen, 1974) suggests confirmation of the earlier claims by Waldbott (1962) that some people are very sensitive to fluoride. Waldbott's claims have been dismissed on two grounds: that he was the only one to report such effects, and that sensitivity of this type has not been reported among the-billions of tea drinkers in the world who would be ingesting extra fluoride (WHO, 1970, p. 15).

Grimbergen's report was a preliminay methodological paper and is not convincing. Two aspects of the methodology seem weak and could lead to erroneous conclusions. First, when large numbers of double-blind tests are done, it is to be expected that control patients will occasionally have symptoms that correspond to those associated with the administration of. fluoride; the investigator should indicate the rate of positive responses and the results of retesting. Second, the patients selected themselves for inclusion in the study based on their beliefs that they were already sensitive to fluoride. Waldbott's case reports (1962) are more completely documented and he used concentrations that were probably too low to be identified by taste. He reported 29 positive responders among 48 people tested. The Royal College of Physicians (1976, p. 63) review stated that sodium fluoride at 1 mg/15 ml of distilled water has a distinctive taste. However, Taves (unpublished, 1976) found that four people out of five could not tell the difference at 1 mg/15 ml.

Waldbott and Grimberger are not the only ones who have described patients with syndromes that they explained as intolerance to fluoride. Douglas (1947) tested 32 patients in a group of 133 with histories suggestive of sensitivity to fluoride-containing dentifrices. He implied that none were able to complete a series of six alternating trials using fluoride and nonfluoride toothpastes, because of intolerance, mainly in the form of ulcerations of the mouth. Feltman and Kosel claimed that, among pregnant mothers and their children, 1% (at least four of them) reacted adversely to 1 mg fluoride tablets. They stated that they established (by means of placebos) that it was the fluoride, rather than the binder, that caused the adverse effect (Feltman, 1956; Feltman and Kosel, 1961). Shea, Gillespie, and Waldbott (1967) reported on seven cases of patient improvement after discontinuing vitamin drops or toothpaste containing fluoride. They subjected one case to a double-blind.

Study with sodium fluoride in the cases involving toothpaste, the associated cation is not stated. Stannous fluoride is commonly used in toothpaste; therefore, sensitivity to tin, rather than to fluoride, cannot be ruled out. Petraborg (1974) reported on seven case histories of what seemed to be fluoride sensitivity, but the patients were not subjected to objective tests, so the evidence is weak.

The quantities of fluoride involved are clearly relevant to the question of the safety of fluoridation. But, if Feltman and Kosel's estimate of 1% intolerant people is correct, there should have been more reports of adverse effects in the studies in which fluoride tablets were given to school going children (at least 10,000 children by 1967, mainly in Switzerland) (O'Meara, 1968). Also, as methoxyflurane anesthesia for surgery typically causes serum fluoride content to increase to 30-50 times normal (Fry *et al.,* 1973), there should have been striking cases of such intolerance in an estimated 12 million patients who have received methoxyflurane (NAS-NRC, 1971). Moreover, cases of intolerance to fluoride (20-100 mg/day) for osteoporosis have been associated with very few symptoms of the type reported by Waldbott. There have not been reports of intolerance from people who move into and out of numerous towns with naturally high fluoridated water supplies. Opportunities for such discovery existed before any bias for or against fluoridation.

So, although sensitivity to fluoride has not been demonstrated firmly, a possibility of

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sensitivity or idiosyncratic reaction to fluoride should be kept in mind. Clarification might come from two kinds of study. Studies on the administration of fluoride drops or tablets for prevention of dental caries should include consideration of possible intolerance and definite statements should be made about any findings in this regard; in most such reports, no comments are made about a search for intolerance. Quibbles and Suttee (1972) have demonstrated an ability of fluoride-resistant cells to remove or exclude fluoride from their interiors *in vitro.* Humans or animals receiving fluoride for long periods should be studied to see whether a cellular resistance develops *in vivo.* If this could be demonstrated, the metabolic consequences of resistance or its absence might shed light on how intolerance could occur.

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1.5 VARIOUS FORMS OF FLUOROSIS :

The various forms of fluorosis arising due to excessive intake of fluoride are briefly discussed below:

1. Dental fluorosis

This form of fluorosis affects the teeth and mainly occurs in children. The natural shine or lustre of the teeth disappears. In the early stage, the teeth appear chalky white and then gradually become yellow, brown or black. The discoloration will be horizontally aligned on the tooth surface as Jines" or ,,soots" away from the gums. Tiny pits or perforations can be seen in the form of cavities on the surface of teeth. Dental fluorosis affects both the inner and the outer surface of the teeth. One can become edentulous even as much younger age in the fluoride endemic areas. The disease has mostly cosmetic implications and has no treatment.

Dental fluorosis

Dental fluorosis is a health condition caused by the critical period of exposure is between 1 to 4 years of ages children over a child age 8 are not at risk. In its mild form, which is the most common, fluorosis appears as tiny white streaks or specks that are often unnoticeable. In its severe form it is characterized by black and brown stains, as well as cracking and pitting of the teeth.

The severity of dental fluorosis depends on the amount of fluoride exposure, the age of the child, individual response, nutritional and other factors. Although water fluoridation can cause fluorosis, most of this is mild and not usually of aesthetic concerns severe cases can be caused by exposure to water that is naturally fluoridated to levels well above the recommended levels, or by the exposure to other fluoride sources such as brick tea or pollution from high fluoride coal.

Physiology

Dental fluorosis occurs because of the excessive intake of fluoride either through fluoride in the water supply, naturally occurring or added to it; or through other sources. The damage in tooth development occurs between the ages of 3 months to 8 years, from the overexposure to fluoride. Teeth are generally composed of hydroxyapatite and carbonated hydroxyapatite; when fluoride is present, fluorapatite is created. Excessive fluoride can cause white spots, and in severe cases, brown stains or pitting or mottling of enamel. Fluorosis cannot occur once the tooth has erupted into the oral cavity. At this point, fluorapatite is beneficial because it is more resistant to dissolution by acids (demineralization). Although it is usually the permanent teeth which are affected, occasionally the primary teeth may be involved.

The differential diagnosis for this condition may include Turner's hypoplasia (although this is usually more localized), some mild forms of amelogenesis imperfecta, and other environmental enamel defects of diffuse and demarcated opacities.

Dean's Index

H.T. Dean's fluorosis index was developed in 1942 and is currently the most universally accepted classification system. An individual's fluorosis score is based on the most severe form of fluorosis found on two or more teeth.

2. SKELETAL FLUOROSIS :

Skeletal fluorosis affects the bones/skeleton of the body. Skeletal fluorosis can affect both young and old alike. One can have aches and pain in the joints. The joints which are normally affected by skeletal fluorosis are neck, hip, shoulder and knee that makes it difficult to walk and movements are painful. Rigidity or stiffness of joints also sets in. More worrisome is that skeletal fluorosis is not easily

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detectable until the disease attains an advanced stage. In severe cases, there is a mplete rigidity of the joints resulting in stiff spine, called as *,,Bamboo spine"* and immobile knee, pelvic and shoulder joints.

Skeletal fluorosis

Skeletal fluorosis is a bone disease caused by excessive consumption of fluoride. In advanced cases, skeletal fluorosis causes pain and damage to the bones and joints.

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Causes

Common causes of fluorosis include inhalation of fluoride dusts/fumes by workers in industry, use of coal as an indoor fuel source (a common practice in China), consumption of fluoride from drinking water (naturally occurring levels of fluoride in excess of the CDC recommended safe levels and consumption of fluoride from the drinking of tea, particularly brick tea.

In India, the most common cause of fluorosis is fluoride-laden water derived from deep bore wells. Over half of the ground water sources in India have fluoride above recommended levels.

Epidemiology

In some areas, skeletal fluorosis is endemic. While fluorosis is most severe and widespread in the two largest countries i.e. India and China. UNICEF estimates that "fluorosis is endemic in at least 25 countries across the globe. The total number of people affected is not known, but a conservative estimate would number in tens of millions.

The World Health Organization recently estimated that 2.7 million people in China have the crippling form of skeletal fluorosis. In India, 20 states have been identified as endemic areas, with an estimated 60 million people at risk and 6 million people disabled; about 600,000 might develop a neurological disorder as a consequence.

Symptomatic skeletal fluorosis is almost unknown in the U.S. with about a dozen of cases reported.

Table No. 1.4
Skeletal fluorosis phases

Osteosclerotic phase	Ash concetnration (mgF/kg)	Symptoms and signs
Normal Bone	500 to 1,000	Normal
Preclinical Phase	3,500 to 5,500	Asymptomatic; slight radiographically-detectable increases in bone mass
Clinical Phase I	6,000 to 7,000	Sporadic pain; stiffness of joints; osteosclerosis of pelvis and vertebral spine
Clinical Phase II	7,500 to 9,000	Chronic joint pain; arthritic symptoms; slight calcification of ligaments' increased osteosclerosis and cancellous bones; with/without osteoporosis of long bones
Phase III : Crippling Fluorosis	8,400	Limitation of joint movement; calcification of ligaments of neck vertebral column; crippling deformities of the spine and major joints; muscle wasting; neurological defects/compression of spinal cord

Field photograph showing prominently in later part of age i.e. above 50 years.

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3. NON-SKELETAL MANIFESTATIONS :

The soft tissues of the body may be affected by excessive consumption of fluoride. The symptoms include gastro-intestinal complaints, loss of appetite, pain in stomach, constipation followed by intermittent diarrhoea. Muscular weakness and neurological manifestations leading to excessive thirst tendency to urinate more frequently are common among the afflicted individuals. Cardiac problems may arise due to cholesterol production. Repeated abortions or still birth, male infertility due to sperm abnormalities are also some of the complications. None of the Cases in observed in the area of study.

1.5 PREVENTION OF FLUOROSIS :

Excessive fluoride ingestion by human beings can be prevented by using the following approaches:

(i) Using alternate water sources:

Alternate water sources include surface water, rainwater and low-fluoride groundwater. **Improving the nutritional status of population at risk:**

Adequate calcium intake is directly associated with a reduced risk of dental fluorosis. Vitamin C ingestion also safeguards against the risk of fluorosis.

(ii) Defluoridation: Removing excess fluoride from drinking water using different techniques such as Nalgonda method. This defluoridation method is based on the combined use of alum and lime in a two-step process

Table No. 1.5
Dean's Index

Classification	Criteria - description of enamel
Normal	Smooth, glossy, pale creamy - white translucent surface
Questions	A few white flecks of white spots
Very mild	Small opaque, paper white areas covering less than 25% of the tooth surface.
Mild	Opaque white areas covering less than 50% of the tooth surface
Moderate	All tooth surfaces affected; market wear on biting surfaces; brown stain may be present
Severe	All tooth surfaces affected; discrete or confluent pitting; brown stain present.

Prevalence

As of 2005 surveys conducted by the National Institute of Dental Research in the USA between 1986 and 1987 and by the Center of Disease Control between 1999 and 2002 are the only national sources of data concerning the prevalence of dental fluorosis.'

. In the area of study dental fluorosis is more prominent: field photographs are showing sedentarily of dental fluorosis in different age group.

The condition is more prevalent in rural areas where drinking water is derived from shallow wells or hand pumps. It is also more likely to occur in areas where the drinking water has a fluoride content of more than 1ppm (part per million), and in children who have a poor intake of calcium.

Table No. 1.6
Dietary reference intake for fluoride

Age Group	Reference weight Kg. (lb)	Adequate intake (mg/day)	Tolerable upper intake (mg/day)
Infants 0-6 months	7(16)	0.01	0.7

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Age Group	Reference weight Kg. (Ib)	Adequate intake (mg/day)	Tolerable upper intake (mg/day)
Infants 7-12 months	9(20)	0.5	0.9
Children 1-3 years	12(29)	0.7	1.3
Children 4-8 years	22(48)	1.0	2.2
Children 9-13 years	40(88)	2.0	10
Boys 14-18 years	64(142)	3.0	10
Girls 14-18 years	64(142)	3.0	10
Males 19 years and over	76(166)	4.0	10
Female 19 years and over	61(133)	3.0	10

Fluoride consumption can exceed the tolerable upper limit when someone drinks a lot of fluoride containing water in combination with other fluoride sources, such as swallowing fluoridated toothpaste, consuming food with a high fluoride content, or consuming fluoride supplements. The use of fluoride supplements as a prevention for tooth decay is rare in areas with water fluoridation, but was recommended by many dentists in the UK until early 1990s. Coal burning can pollute air with fluoride: indoor air with approximately 60 ug F/m^3 and drinking water with 3.6 mg F/L are similarly toxic to developing permanent teeth.

Dental fluorosis can be prevented by lowering the amount of fluoride intake below the tolerable upper limit.

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Treatment

Dental fluorosis can be cosmetically treated by a dentist. The cost and success can vary significantly depending on the treatment. Tooth bleaching, microabrasion, and conservative composite restorations or porcelain veneers are commonly used treatments. Generally speaking, bleaching and microabrasion are used for superficial straining, whereas the conservation restorations are used for more unaesthetic situations.

Following villages namely Ramkheri, Mahoriya, Phutibawari, Hasnabad Jahangirpura, Kauriya, Ujarkhera Pipliyaminan Barkhedri, most of the children are affected by dental fluorosis, some adults are facing pain problems field photographs showing different type of dental carries.

Field photographs –

52 yrs. man affected by skelton fluorosis Mahoria

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CONCLUSION

Deals fluoride and Health :- Fluoride concentration in drinking water plays a critical role in human health In take of excess fluoride through drinking water causes fluorosis in human which can not be clinically treated. Fluorosis in initial stages causes body pains, yellowing of teeth and subsequently skeletal deformity. Out of 57 samples eight villages namely Ramkheri, Mahoriya, Kuuriya, Pipliyamiran, Berkheri, Hasuabad, Jahangirpur and Tyarkhera peoples are affected by mainly dental and skeletal fluorosis, children up to the age of 10 years mainly affected by dental fluorosis while age group of 45-55 affected by skeletal fluorosis.

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